THE VETERINARY RECORD

A Weekly Journal for the Profession.

No. 480. SEPTEMBER 18, 1897. VOL. X.

"TECHNICAL SKILL NOT REQUIRED."

When is technical skill required?

Whenever work of the nature of an art is to be done or supervised. This answer may perhaps be subject to some limitations. When the work to be done is strictly confined to some special art then a properly trained expert is the right man to do it. When a watch needs repair the technical skill of a watchmaker is required. But if the question be a wider one such as the expediency of having a clock-tower to a new public building, there is something more required than the technical knowledge of a watchmaker. There is a financial and an architectural question to be considered, and this must be settled before the smaller and more limited matter of the clock itself comes up for decision. Or take the case of a modern war ship. Its movements are consequent on the action of engines, the control of which are properly left to experts possessing technical skill. The engineer is subservient to the captain because the engines are only secondary objects, and the movement of the ship is to be regulated by wider and more important considerations than are embraced by the art of the engineer. The position of the watchmaker and of the engineer is clearly defined, and just as an architect would never interfere with the building of a clock so a captain would never take upon himself the charge or control of an engine.

When dealing with inanimate bodies the ordinary rule is to leave technical matters to the expert. Sometimes the help of an expert is difficult to obtain, and in new countries where population is not overcrowded men enter trades they were not trained to, and their success varies. A few years ago the town of Cincinnati issued an edict that no man was to look after a boiler who had not been trained to that calling. What led to this regulation was the employment by a brewery company of a German tailor to superintend the boilers attached to the engine house. After the necessary inquests and the re-building of the brewery it was unanimously agreed that only men possessing technical skill should be employed in special and dangerous callings. Machines and inanimate objects have neither eyes nor brains, and their behaviour depends upon the possession of these organs by the person controlling them. When we come to deal with animals and men it is quite different. The stupidity or ignorance of the director may not be so disastrous owing to the sense of those directed. Soldiers by skill and pluck may save themselves from the disaster provoked by a stupid commander. A horse may take a vehicle safely home when its driver has succumbed to cold or alcohol. But even when disaster occurs from want of technical skill upon the part of the director excuses are readily invented, and the men may be accused of faults just as the horse may be blamed for vice or stupidity.

These considerations are suggested as a partial explanation of the fact that whilst technical skill is generally acknowledged to be necessary for supervising inanimate objects, very few individuals and fewer collective bodies appreciate the necessity of technical skill for supervising men or animals. The art of teaching is vastly important and highly technical, and yet we see teaching undertaken by persons utterly wanting in either natural or acquired requisites. We have a Government education department with a staff of inspectors. A constant complaint of the expert teacher is that the departmental staff is largely recruited from retired army men. Farming is an art. All sorts and conditions of men devoid of all technical knowledge launch confidently into the direction of a farm. We have a Board of Agriculture and as everyone knows not a single practical farmer on its permanent staff.

The art of healing disease and of preventing it is highly technical. All clergymen and most old women will advise on sanitary matters or prescribe for disease with an ignorance and innocence that is simply child-like. We have in this country recognised the abstract value of public medicine, and laws have been made to control and prevent disease amongst men and animals. There are Veterinary Inspectors and Medical Officers of Health, men trained for their art and possessed of technical skill. Quite properly these men are subject to public bodies who carry out the law, and are supposed to be guided by the advice of their technical officers. As a fact only in few cases is this rational method adopted. The custom is to ignore the technical reports and to make the work of the expert subservient to the notions of the laymen.

When Parliament recently passed the Public Health (Scotland) Act a very determined effort was made by Scotch lawyers and authorities to push the medical officer into a subordinate position, to make him a sort of technical adviser to be called in when a purely medical question required explaining—in other words to help out of difficulty and blundering some executive officers destitute of any knowledge of the art they were practising.

The veterinary profession has for some years occupied the exact position intended for the medical by the Public Health (Scotland) Bill. We are employed to diagnose disease—the most difficult technical part of the whole duty of controlling and preventing it. Having done this, we are immediately superseded in the remaining necessary steps. Technical skill is limited to consultation, but should be possessed by the executive officer.

CASES AND ARTICLES.

THE GLANDERS ORDER (1894) A FAILURE.

Records of the prevalence of glanders show that the disease has always fluctuated—increasing and decreasing according to the circumstances which favoured the transmission of active specific germs. The collection of large numbers of horses on an emergency for army purposes has always included some diseased animals which spread glanders. On the scattering of these by sale when they have fulfilled their purpose glanders has been spread very widely. A good illustration of this occurred at the military maneuvres held some years ago on Salisbury Plain. In war time glanders is usually spread. During the Egyptian war cavalry from India brought glanders to Ismailia, and the return of our troops brought infection to England. An increase of disease is always noticeable during or immediately following the prevalence of an epizootic of influenza. This was very marked in London in 1891 and 92 and is easily explained. Glanders is a chronic disease, infecting other horses chiefly through the nasal discharge. This discharge is most virulent in acute cases, and the existence of a severe febrile disease like influenza multiplies indefinitely the number of cases of acute glanders.

Probably there is no contagious disease of the horse about which veterinary surgeons are more agreed or concerning the spread of which more exact knowledge is possessed. That it could be stamped out easily and rapidly is acknowledged by every authority. That it ought to be extirminated is demonstrated by the heavy annual loss it inflicts upon horse-owners, by the danger it is to human life, and by the constant risk of inefficiency to which it exposes our army. In the face of all this we are again at a period when the disease is increasing and nothing is being done by authorities to check it.

The increase of glanders this year is more than usually serious because horse-owners and veterinary practitioners have for some time been united in their endeavours to control it. For four years we have had the advantages to be derived from the discovery of mallein. This agent enables rich men to control an outbreak in their studs with certainty and rapidity, and yet the disease is increasing. It is to be feared that the danger pointed out by Professor Brown has arrived, and that horse-owners are using mallein to detect disease before clinical signs are apparent and having assured themselves of infection are selling the suspected horses. Whether such a proceeding be legal or illegal, we may be sure it will be adopted. The risk is infinitesimal, and no such economical method of clearing a stud can be adopted.

The experience of thirty years struggle with the diseases of animals has demonstrated that until authorities behave with liberality to owners success is not attainable. The sale and movement of animals suffering from Cattle-plague, Pleuro-pneumonia, Foot-and-Mouth Disease, and Swine-fever has never yielded merely to legal restrictions.

The control of disease has only been attained by measures which restricted and which assisted the efforts of owners. Existing restrictions if accompanied by fair compensation to the owner and the intelligent use of mallein, are sufficient to stamp out glanders in a short time and at small expense. The Glanders Order of 1894 is a failure because it compels local authorities to do nothing. It permits authorities to make regulations, but as a fact more than half of these bodies have made no regulations. The reason the Order is a failure is that it was not framed to control disease, but as a compromise with the notions of the London County Council. For some years a local authority was obliged by law to slaughter glandered horses. Then an improved Order was issued which included farcy with glanders, and ordered slaughter with compensation. As about 90 per cent. of all glandered animals are found in London the County Council of the Metropolis declined to act upon the law and induced Mr. Herbert Gardner to issue the existing Order which permitted slaughter of a £100 horse on payment of the carcase value. Naturally horse-owners have not co-operated to carry out this unjust measure. Rich owners have stood the loss and acted manfully, but many of them are now disheartened by finding their efforts fruitless. At great expense they have cleared their studs, only to find in a few months re-infection from some of the centres over which they have no control.

As practically the extinguishing of glanders in London would mean its disappearance from the whole country the measures adopted in London are of supreme moment to the whole Kingdom. The only arguments advanced in favour of the incomplete methods adopted in London are—the cost, and certain excuses invented to try and show that success would not be probable without fresh parliamentary powers.

The present cost of the unsuccessful measures saddles the ratepayers with an annual bill of about £6,000. It is easy to show that a less sum properly expended would be successful. Then it is argued that the charge for suppressing disease should be an imperial not a local one. The reply, that so long as London contains 80 per cent. of all cases so long should the charge be local, seems unanswerable.

The argument that no compensation should be paid for glandered horses is a purely abstract one and opposed to all precedent. If the suppression of glanders be worthy of the interference of authorities, it is certainly more logical to adopt thorough measures which will command success than half and half regulations which restrict horse-owners and entail expense to the ratepayer, but do not stamp out disease.

The excuses for doing no more, made by the Council, are that they cannot take effective action until they possess power as to—

(1) Compulsory notification of disease by veterinary surgeons.

(2) Inspection and supervision of trade stables.

(3) Evidence of freedom of disease in imported horses.

Not one of these powers is necessary to control glanders in London. It is unlikely that Parliament

would give power to intrude officially into a trade stable more than into any other.

Importation of disease is exceptionally rare and may practically be put aside as affecting London.

All that is wanted in London is a better organisation of the veterinary inspection and payment of a liberal compensation to owners. It is improbable that the Council will take any further step, and therefore the only hope is that the Board of Agriculture will withdraw the existing Order and issue another which cannot be evaded. An Order which enforces nothing and permits a minimum is never likely to do any good. Were it not for the enlightened policy adopted by veterinary practitioners glanders would be as prevalent now as it was forty years ago. The danger is that the practitioner may become disheartened by the failure of authorities to support his action. To advise an owner of horses to stamp out glanders from a stud is good advice, and one not uneconomical if local authorities contribute to the loss. But the most economical plan where authorities will not help is to use mallein and prevent the appearance of disease.

Ever since contagious disease in animals was legislated for in 1869 complaints have been made of the want of uniformity displayed by local authorities in carrying out orders. To this was traced a good deal of the failure to control Pleuro-pneumonia, Foot-and-Mouth Disease, and Swine-fever. Experience has shown the complaint was well founded and never until the Glanders Order of 1894 did the Central Authority deliberately frame an Order to increase confusion and multiply diversities of regulations. Slaughter with compensation has always been the essential item of successful legislation against contagious disease. In every case, except glanders, has the amount of compensation been definitely stated. In glanders compensation is left to the ignorance and meanness of any local body; it may be one-fourth the value of a horse or the price of the carcase. The London County Council endeavoured to limit the compensation to carcase value but even Mr. Herbert Gardner could not stand that proposal and told the deputation that "some local authorities might be inclined to act with greater generosity"—he ought to have said, with greater justice.

We have endeavoured to find out what is done by the various local authorities and our enquiries show a curious want of uniformity in practice. The majority of local authorities have no glanders in their district and have made no regulations under the Order. When an outbreak occurs for the first time in one of these districts there is utter confusion. Action is taken and to make it legal regulations are drawn up and issued in a hurry. In some places the owner, after notifying, is permitted to kill and bury at his own expense. In others his premises are watched by police, all movement of animals is stopped, the infected horse is killed and the disinfection and destruction of the building, harness, forage, litter, etc., is carried out on the most lavish scale. At least one local authority gets out printed placards announcing the existence of disease and so pillory the owner for a misfortune over which he had no control. Such a proceeding can do no good and it deters men from notifying. As regards compensation, every variation which human ingenuity can invent is adopted. Full compensation, partial compensation, no compensation, carcase value, are all in force.

Full compensation, *i.e.*, one fourth the value of the horse is paid by the following local authorities—

Liverpool	Manchester	Newcastle-on-Tyne
Wigan	Cumberland	Hertfordshire
Guildford	Kent	Dudley
Huntingdon	Westmoreland	Lancashire
Worthing	Berks	Southampton
Worcestershire	Brighton	Leeds
Sussex	Cheshire	Northumberland

No compensation is paid by

Durham	York (N.R.)	Surrey
Sheffield	Birmingham	Middlesex

£2 per horse is paid by West Ham.

Compensation according to the merits of each case is paid by

Northampton Oxford Bedfordshire
Leamington Barrow.

Compensation in London used to be the lowest permissible under the Order, but since Mr. Justice Charles, summing up in a case concerning glanders, stated his opinion that compensation should be paid on all cases according to their merits, the Council have made an alteration. The uniform payment of £2 has nominally ceased, but practically that amount continues to be paid for every case in which a horse presents clinical symptoms of glanders. In such cases as are destroyed solely on the indications of mallein payment of one-fourth value is made, provided the horse is not valued above £20. This is a purely arbitrary arrangement which may induce owners to permit the use of mallein, but which has no relation either to the value of the horse or the virulence of the disease. A horse may be badly infected and yet show no outward signs of disease. A horse showing one solitary farcy bud may be less dangerous and more curable than a horse that gives no indication except reaction to mallein.

Fairness to owners and expediency in carrying out the law both demand a definite scale of payment and, as Justice Charles said, one in proportion to the value of each animal slaughtered. It would be better for every reason to fix compensation at one fourth the value of the animal.

It is very curious to find six local authorities making a rule to pay no compensation. Of course this means neglecting to enforce the Order, and is an exhibition of ignorant egoism on the part of the men who fancy they know better than others. Representative bodies seldom number amongst them more than 2 per cent. of members who know anything about horses or disease. Horse-owners have no associations to help them, so regulations are made which ignore their interests and pretend to study the pockets of the ratepayers.

The Board of Agriculture know what is required, and is the proper body to make regulations. The Order of 1894 should be replaced by one framed solely to control disease. It has failed and should be amended.

RUPTURE OF THE STOMACH IN A HORSE.

By P. J. Howard, M.R.C.V.S., Ennis.

Of the following case I publish the facts, hoping to elicit some information on the subject.

A six-year-old black harness cob that had been in gross condition up to February of this year, was noticed since then to grow thin and become dull. He was doing ordinary harness work, and though well fed and cared for would not put up condition.

On August 15th he was driven some 16 miles, on the last five of which he grew very tired and seemed sick. The driver noticed some blood-coloured matter coming from the mouth and nostrils, and said there was a gurgling noise in the throat and some swelling of the abdomen. The horse refused drink and food, but showed no definite signs of pain.

Late on that evening I saw him and he then seemed tired and dull, but otherwise alright. Next day I examined him and thought his teeth were at fault, and might have caused the bloody discharge. I had them filed and gave a dose of calomel, and the horse was fed on soft food for a few days and again put on his usual diet of oats and bran. He did a few turns of slow work and fed not badly.

On September 2nd I drove the horse, and though very dull he went fairly well for about eight miles. Then he began to sweat profusely and swell. When pulled up he soon showed signs of pain and was inclined to lie down. I walked him about half a mile to the nearest house, had him unharnessed and led into a paddock. I gave two glasses of whisky with an eight ounce bottle of Prof. Walley's creosote liniment which I happened to have. Breathing was slow, pulse weak and fast, and tympany was very great. He made desperate attempts to vomit, and dirty bloody matter came from mouth and nostrils. He moved only backwards and forwards seeming in great pain. He rolled once, stood up again for a few moments and then literally dashed himself to the ground and died quite easily, having lived only about 20 minutes from the time I noticed him.

I made a post-mortem at once and found the diaphragm ruptured along the whole of the near side for about 18 inches. The stomach was ruptured (muscular coat only) for about 14 inches along the great curvature. On the posterior face of the stomach the divided edges of the muscular coat were 2½ inches asunder for about six inches, and the edges seemed contracted. The lining membrane (villous portion) had given way for about 2½ inches at the top of this space. It was impossible to decide whether there was any gastritis or peritonitis as the contents of stomach etc. had discoloured everything.

The liver was very much enlarged, and the anterior half was apparently amyloid. The abdominal contents were otherwise healthy as were also the lungs and heart.

I concluded that the primary mischief was the liver, that the muscular coat of the posterior face of the stomach was ruptured since the 15th August, that the rupture had extended, and that the lining membrane gave way only on that day September 2nd. The diaphragm was ruptured, I believe, by the attempts to vomit.

Perhaps some of your readers may throw light on the subject as to whether the horse could have lived 18 days and done work if his stomach was partially ruptured on the 15th August, as I believe it to have been from the symptoms then shown. Also whether vomiting is a symptom or a cause of rupture. The late Professor Walley did not think a horse could vomit with ruptured stomach, and indeed it is hard to understand how he could; perhaps the fact is that vomition takes place when the muscular coat only is ruptured, which seems to have happened in this case.

SWINE ERYSIPELAS OR WHAT?

T. B. Bindloss, M.R.C.V.S., Long Sutton.

I have this summer come across many cases of a disease which I think must be a form of swine erysipelas, notwithstanding some differences it appears to have from that disease, and therefore I am bringing it to your notice hoping to hear from some of the more experienced members for the benefit of the profession generally and the public in the neighbourhood of South Lincolnshire.

It is locally called "purples" and correctly so as far as the symptoms are concerned, but incorrectly so considering that purples is a synonym for swine fever to which this disease bears no relationship.

The pigs generally affected are those put up for feeding or those that are doing particularly well, and it appears that the better the pig the more severe the attack. Store pigs when attacked will last much longer than fat ones, and frequently recover.

Disinclination to feed is the first symptom seen, though the pigs will often drink. Temperature 106·7, bowels constipated, and in from 12 to 24 hours after first noticed there appears a swelling under the jaws which is of a purple colour. This rapidly spreads up the ears and very soon over the whole body. On pressure this discolouration disappears, but returns on removal of the pressure. (This discolouration is purple from the start and deepens as the disease progresses.) At this stage the pigs lie in a helpless condition and generally die in from 12 to 48 hours according to the severity of the attack.

Post-mortem examination reveals but one constant lesion, viz., acute gastritis. Sometimes this is accompanied by enteritis and pneumonia, and I have come across a few cases of endocarditis, *but I have never seen any lesion in the spleen.* That this is an infectious disease I have no doubt, though all the pigs in an infected place do not become affected, but I have frequently noticed that when one pig dies from the so-called purples other cases will very soon appear in that same neighbourhood. Cases will also crop up year after year in the same sty. We have a large pig dealer here who will bet that after a pig has died from this disease if you put another pig in the same place (without disinfecting) that it will not live a week, and will generally die in from three to five days. This is practical experience that one must take notice of.

The Board of Agriculture, in their report for 1896, state that swine erysipelas is neither infectious nor contagious, that being the case what is this disease?

DELABERE BLAINE.

1768—1848.

The following is an abstract from an interesting biographical sketch of Blaine written by Professor Simonds last year. We are indebted to the courtesy of the author for permission to reproduce.

Quoting from Blaine's Biography, as recorded in his 'Veterinary Outlines,' 1832, we read :—"I was educated by my maternal grandfather, a dignitary of the Cathedral Church of St. David's ; the Bishop of which became my godfather, with an understanding that I was to be brought up to the church under his auspices. Unfortunately the principles of my father, as a Dissenting Divine, frustrated these prospects ; and it was at length agreed between the two parents, that I should be consigned to a less learned but more laborious profession, the *ars medendi*. In consequence of this agreement, I was, at the age of fourteen, placed with an eminent practitioner in Buckinghamshire, for the then customary period of seven years."

My next remove was to the Borough Hospitals, where I remained for the space of two years, at the expiration of which I spent six months more with Dr. Haighton, assisting him in physiological experiments.

By this early friend of my family I was recommended as a fit person to fill the situation of assistant teacher of anatomy to the New Veterinary School, as well as translator and demonstrator of the lectures of Professor Sainbel. In this situation I remained about twelve months, when some impolitic attempts of mine to convince the Professor that many of his anatomical, but many more of his physiological, ideas were incorrect, made him wisely conclude that it would be imprudent to retain one about him who was able to detect his errors, and I in consequence received my *congé*.

I had, however, remained long enough to imbibe a strong attachment to veterinary medicine, and, circumstances removing me to Lewes, in Sussex, I there gave some public lectures on the anatomy and pathology of the horse, and commenced a course of veterinary practice. It was here I first entered on a series of experiments on the never-ending subject of contracted feet. This situation was also particularly favourable to the study of the diseases of oxen and sheep, which I did not neglect, and in which I was greatly assisted by the liberality of the Sussex farmers, who furnished me with subjects.

But as the practice of economy was not at that time my *forte*, my expenditure so far exceeded my income, that I was under the necessity of relinquishing these pursuits, and of accepting an ensigncy and assistant-surgency in the East Middlesex Militia, where I remained till General Gwynne recommended me to a surgeoncy to one of the troops of horse artillery then stationed at Woolwich, with which I remained nearly three years, extending my knowledge of human medicine by witnessing the judicious management of the Woolwich Artillery Hospital, under the direction of the late ingenious Dr. Rollo. Nor had I less opportunity also for improvement in the veterinary art, from the circumstance of all the sick horses belonging to the establishment being, at that time, placed under my inspection.

It is probable I might have remained here some years longer, but, my relations becoming urgent with me to settle in life, I left the army practice, and settled as a surgeon in the neighbourhood of Queen Square, London ; but, although thus engaged, I could not remain forgetful of my former predilections ; my leisure time was therefore employed in dissecting, drawing, and arranging materials for a folio edition of the "Anatomy of the Horse." But fate again interposed, seeming to have ordained that I should not remain long in one situation ; for I suddenly came into the possession of a considerable fortune by the death of a relative, which induced me to retire into the country. Unfortunately, I had not yet gained a prudent mode of managing money, and after living expensively as a sportsman and country gentlemen for a few years, I found myself again under the necessity of entering active life.

I first accepted a commission in the North Gloucestershire Regiment of Militia, and passed with it a campaign in Ireland during the rebellion ; but after two years wasted in this manner, prudence dictated that it was doing nothing towards my future welfare ; and on the announcement of the expedition to the Helder, I offered my services to the Medical Board, which were accepted, and I was appointed surgeon to the second battalion of the 40th Regiment of Infantry, and immediately embarked with them for Holland. As this regiment particularly distinguished itself, and bore the brunt of several actions my experience in my profession received considerable additions.

On our return from Holland I finally quitted the army, and retired for a twelvemonth in Northumberland, where my days were occupied in field sports, and my evenings in arranging the materials for the first edition of "The Outlines of the Veterinary Art." But this plan of life also furnishing no prospect of future advancement, I debated what ultimate course it would be most prudent to pursue, when the practice of human medicine naturally presented itself ; but it was unpleasant to reflect that I had lost some years in my start, and that my contemporaries, for the advantage of early residence and locality, had outstripped me in the race ; and that, the market being already overstocked with human surgeons, I had numerous difficulties to overcome, and additional time to waste, before I could hope to get even into tolerable practice.

While thus irresolute in my plans, my former pursuits and writings having gained me some little popularity, I was, as it were irresistibly, and almost insensibly, drawn into correspondences and into practice on the diseases of horses and dogs, which increased at length so much as to determine me to devote all my future professional energies to these subjects In this almost unbeaten track I might hope to reap both fame and emolument ; and although it might not appear so honourable a calling as that of human medicine, it was, at least, a very useful one, and, under all the foregoing circumstances, the most prudent one.

Actuated by the above motives, I abandoned my wanderings, and maintained a steady perseverance in these pursuits ; and from thence has resulted that popular and extensive practice on the diseases of animals in general, so well known in the British metropolis ; and from the same source have sprung my various veterinary publications, all of which have passed through several editions, and all have been translated into continental languages.

These circumstances will, I hope, in every candid mind, concede to me the point of legitimate veterinary claim, if such be requisite to give weight to my writings. Situated as I was as a teacher, long before Professor Coleman had turned his attention to the subject, it was not to be expected that I would seek a pupil's diploma from the school in which I had myself taught."

It will be observed that Blaine, in the preceding interesting narrative of his early and eventful life, does not name the date of his birth. The fixed dates, however, of special occurrences, as furnished by him, are sufficient to

determine this, if compared with the time of St. Bel's death, the first Professor of the Royal Veterinary College, who was appointed in 1792, and died in August of the following year, the result thus shows that Blaine was born in 1768.

Probably in or about 1795 Blaine, having at length fully resolved to devote his time entirely to veterinary surgery with a view to its advancement and improvement, took up his residence at No. 19, Golden Square, occupying his time at the beginning, chiefly in completing the matter for his forthcoming publications. The first of these would appear to have been "The Outlines of the Veterinary Art," or the Principles of Medicine as applied to a knowledge of the structure, functions, and economy of the horse, ox, sheep, and dog, and to a more scientific and successful manner of treating their various diseases. Illustrated by anatomical plates. 2 vols., 8vo, 1802.

Its publication may be said to have established a new era in the history of veterinary medicine, embracing as it did a scientific description of the several diseases of the horse, together with some of those to which other animals were exposed. Also a copious and well-selected materia medica.

A second and third edition soon followed, but, valuable as this work was, a fourth and improved edition was not reached until 1832; a fifth and last edition (1841) succeeding.

In a collated article on glanders by the late Wm. Percival, veterinary surgeon First Life Guards, published in vol. xvii. of *The Veterinarian*, 1844, the following quotation from Blaine's early writings is recorded, viz.—"That he had ever felt convinced of the specific nature of this disease, which for variety in its mode of production, continuation, and termination has no parallel, and to which only we can attribute the unsettled state of public opinion concerning it, but which does nothing to unsettle its claim to the character of a direct and peculiar poison, which can always beget its like, and its like only." He further adds, "But when I find nothing but the same type of disease follows the infection, I can only consider such an infection as one of *sui generis*."

Alluding in another part of his "Outlines" to diseases of the kidneys, Blaine rightly observes, with regard to "redwater in cattle," that "it appears to be a disease of the digestive organs more than an affection of the kidneys, and is, we apprehend, justly attributed to derangement of the liver and stomachs." It may also be added with reference to rot in sheep, that Blaine quotes at some length the opinion by the late Dr. Harrison, viz., that rot was a parasitic disease, and one not depending on mere common causes, such as changes of weather, etc., an opinion with which he fully agrees.

Blaine's next work to be noticed is entitled "A Concise Description of the Distemper in Dogs, with an Efficacious Remedy for it." Whether this treatise was written before or after the original edition of the "Outlines of the Veterinary Art" cannot be rightly determined. It is of duodecimo size and consists only of 39 pages. It appears, however, to have had a free sale, as a fourth edition was published in 1806.

Conjointly with this publication also appeared "The Outlines of a Plan for enabling Persons not Medically Educated to Practise Successfully on the Diseases of their own Horses and Dogs, with a Compendious and Clear Account of the Symptoms and Appearances of the several Diseases, accompanied with a Judicious Assortment of Ready Prepared Remedies." Directions were also appended of the names of persons and their places of abode, where the several medicinal Compounds could be obtained, either in London or in the country. The list is a long one, containing upwards of two hundred names and places.

It was a strange step to be taken by a scientific practitioner, but, doubtless, it proved a profitable one, while it also tended to lessen the value of the nostrums of farriers in the estimation of intelligent horse and cattle owners. The first two editions of the work having been soon exhausted, they were followed by a third and subsequently by a fourth; the last being dated 1810, price four shillings in boards.

In 1810 another work also appeared from the pen of Blaine, entitled "A Domestic Treatise on the Diseases of Dogs," containing a description of every disease to which they are generally liable, and the mode of cure; being the result of nearly twenty years' diligent attention to the subject, together with a very copious detail of the symptoms and progress of madness in dogs."

As might be expected, the larger portion of this work is occupied by a description of that fearful and deadly disease, evidently the result of an accurate and long investigation of its pathology. With reference to the term hydrophobia, he writes that "as dogs never refuse water when mad, or even show the least aversion to it, but on the contrary are eager, from the fever, to lap it, so it is evident that this term is a complete misnomer with regard to them."

Subsequently this work, largely increased in size, went through several editions, entitled "Canine Pathology," the fourth of which was published late in the author's life.

While residing in Golden Square Blaine hired some stables, for infirmary and other purposes, in Argyll Street; but these not suiting his requirements, he shortly afterwards removed his establishment to No. 5, Wells Street, Oxford Street. Here he fitted up a large infirmary for horses and dogs, with additional stabling for the sale of horses on commission, advertising extensively "the advantages gentlemen would have in dealing with him, compared with other persons, as they would thus be protected from purchasing unsound and comparatively useless animals."

The practice in Wells Street greatly increased, and it was here that in or about 1812 Youatt joined Blaine in conducting it; the returns shortly after that time are reported as amounting to £1,500 per annum. The London sale for veterinary medicines, which has been previously alluded to, was now added to Youatt's establishment in Nassau Street, where subsequently an infirmary for dogs was also erected.

The partnership entered into between Blaine and Youatt existing up to 1825-6, after which date Blaine, retiring therefrom, appears to have again devoted his time principally to literary matters, his first publication being a new edition of his work on "Canine Pathology," which included a fuller description of the causes, symptoms, etc., of canine madness and also of other diseases. This improved work having passed through two editions, a third was published in 1832. Youatt, however, continued to conduct the Wells Street business unassisted until about 1834-5, when he entered into a partnership with Mr. Ainsley, a graduate of the Edinburgh Veterinary College.

On the formation of the Veterinary Medical Association in 1836, Blaine, who was then nearly seventy years of age, was elected an Honorary Fellow of the Society. That he was probably living in 1844 is also shown by a remark made at that date by Youatt when writing on medicinal agents used in veterinary practice, viz., that he—Blaine—has less confidence in the use of pulvis antimonialis as a remedy in febrile affections than when engaged in practice. There is even some further evidence to the effect that in this year he was engaged in arranging matter for a sixth edition of his "Outlines of the Veterinary Art," the fifth having been published in 1841.

After most diligent search, however, we have not succeeded in finding the precise date of Blaine's death, but

that he died in or about 1848-9 would appear most probable, from the characteristic remarks made by the late Thomas Walton Mayer, M.R.C.V.S., who, as previously stated, edited the fifth edition (1851) of Blaine's work on "Canine Pathology." Blaine, if living in 1848, would have reached the age of eighty.

EXTRACTS FROM FOREIGN JOURNALS.

TREATMENT OF OPEN JOINT WITH CORROSIVE SUBLIMATE PLUGS.—By A. STEEGER.

A yearling, while at pasture, had been kicked by another horse and had at the outside of the off hock a wound running obliquely, corresponding in size to a calkin. There was only a little swelling, but a pretty considerable flow of synovia.

On the first day it was thoroughly disinfected and an iodoform gauze bandage put on.

On second day the wound was cleansed, well dried, and a plug of corrosive sublimate pushed in (according to Himmelstoss 5 g. (N.B.—This is not grs. v but 5 g. Trans.) of finely powdered sublimate with an equal quantity of cacao-butter rolled into little rods of suitable diameter) The little rod was pressed into the orifice of the wound and to hinder movement a piece of wadding was placed over the wound, a round bit of plaster over that, and over the whole a plaster bandage in oblique strips.

On the 4th day the bandage had become loose through the flow of synovia. Two sublimate rods were then pushed into the wound one above the other. The synovial flow was checked. This treatment was continued every day in the above manner.

On the 13th day resolution of the wound had taken place. In 2 days more the yearling was taken away.

In another case a foal had wounded herself on a harrow at the back of the fetlock joint. The owner's attention was directed to her on the 2nd day when severe lameness was present.

On the third day the general health of the foal was considerably disturbed, there was a great flow of synovia and a painful swelling. At first ice poultices were applied.

On the next day pain had considerably subsided, a rod of sublimate was introduced, and on the fourth and seventh days the treatment was repeated. The synovial flow was stopped and the general health good. After treatment consisted in dressing with iodoform and boracic acid. Complete cure. (*Wochenschrift f. Thierarztliche.*

PARALYSIS OF THE NEAR SIDE (HEMIPLEGIA) IN A MARE.—By Veterinary Surgeon FISCHER.

On December 17th, a 6-year-old mare went off feed. The near half of the under lip hung down, the near hind leg was dragged when trotting. The hind quarters rolled but pain over the muscles of the quarter was not evinced. On slight pressure over the kidneys the mare crouched considerably, while on lightly touching the croup she raised her back.

On the 19th the general health was good but the gait worse. The tail hung limply.

On the 25th back-raking was necessary. Urination was difficult, and the tail could no longer be elevated.

On December 29th the left eyelid was immovable, the left ear lopped as well as the left side of the under lip. The head was twisted and the near side inclined to the ground. The animal was very timid, could turn with difficulty, staggered in her gait, slid the near hind leg forward in a circle and put her fore legs wide apart. Fæces were not voluntarily passed. Urination was accomplished with difficulty. The point of the clitoris was drawn to the right. Appetite good but food taken with difficulty. Pulse 36; breathing 17; temperature 39·2 C. Sensibility nowhere lost. Evidently there was complete paralysis of the facial nerve and partial paralysis of the lumbar nerves. Cold compresses were put on the mare and she had injections of strychnine nitrate. Hereupon severe spasms occurred and the mare fell backwards on her hind quarters. The spasms continued a minute and were followed by weaker ones. The further treatment consisted in daily hypodermic strychnine injections discontinued every 4th day which suited the mare well; besides cold water clysters were used every day and every other day rectal glycerine injections. The mare stood up with trouble and tottered. She was led out daily. The gait visibly improved.

On January 10th she was not lame when walking.

On January 18th she went sound at the trot, only staggered now and then without however falling.

At the end of January tail was voluntarily raised and excrement passed. In March she was only having cold water clysters and daily exercise. The rolling gait ceased at the end of March. Defaecation was accomplished normally, but appearances of facial paralysis still continued.—*Ztschr. f. Veterinarkd.*

G. MAYALL, Trans.

EXTRACTS AND NOTES.

WHAT CONSTITUTES UNSOUNDNESS IN A HORSE?

At the Stourbridge County Court on Wednesday, September 8th, before his Honour Sir Richard Harrington, Bart., an action was brought by Arthur Timmins, builder, Hales Owen, against Alfred Hall, the Royal Oak Inn, Hasbury, to recovery £10 for breach of warranty. Mr. E. H. Grove was for plaintiff, and Mr. Mellor for defendant.—It was denied there was any warranty.

Plaintiff's case was that he bought the horse in question in May last from defendant, who said he warranted it to be as sound as a bell. The price was £12, but 5s. was given back. Next morning the horse drew some ashes, went to Old Hill, and afterwards drew some clay without showing any signs of lameness. Afterwards, however, after having been some time in the stable, plaintiff said he found it very lame. Defendant refused to have the horse back and return the money when asked to do so, and the horse was sent to Cave's Repository and sold for £4 14s. 6d. Cross-examined, he denied saying to defendant that if the horse was sound it would be worth £30, but that he (defendant) knew it had been fired.

Mr. W. Bailey, veterinary surgeon, Hales Owen, said on May 29 he found the horse very lame with spavins on

both hocks, and the fore feet had very bad large sidebones. The horse was only fit for the knacker's yard. In his opinion, the defects had existed for years, and one hock was half as large again as the other.—The Judge: The most stupid person could have seen that? Witness said anyone could have seen the one was larger than the other.—Mr. Mellor asked witness if he knew the horse was still at work in Hales Owen? Witness said if it was now at work, it was unfit to work.—His Honour: Have you anything to do with the Society for the Prevention of Cruelty to Animals? Witness: No, sir.

His Honour drew attention to a contradiction in the evidence of plaintiff and Mr. Bailey, and Mr. Grove said he had two horse doctors whose evidence he asked to be taken in lieu of that of the veterinary surgeon on the point His Honour referred to.

George Partridge, one of these persons, said he did not agree with the veterinary surgeon as to the lame condition of the horse. Witness bought it at Cave's Repository, and it was fit for regular work now, and he worked it without any fear of prosecution. The horse was not now lame. It was a bit stiff in the morning, but after being out a few minutes it was all right.

Daniel Parsons, Hasbury, said he could not see anything the matter with the horse.

His Honour said he was not satisfied a breach of warranty had been proved. The evidence of the horse dealers took away the value of the evidence of the veterinary surgeon, and this evidence gave the plaintiff's case away, when the one man said he now had the horse, and was not afraid to use it, though if the veterinary surgeon's opinion was correct, he would be in perpetual fear of prosecution by the Society for the Prevention of Cruelty to Animals. The question was, assuming there was a warranty, whether the existence of spavins and sidebones, apart from lameness, was unsoundness; and he did not think it was. Mr. Oliphant, in a book on the law relating to horses, handed up to him by Mr. Dorsett (who was present at the advocates' table), laid it down as a general proposition that spavin was unsoundness. He did not agree with that. The question was whether the disease was of such a character as to cause lameness. If so, it was unsoundness. If it was a mere malformation which made a horse unsightly, and did not produce lameness, that was not unsoundness, in his opinion. He non-suited plaintiff.—*Birmingham Daily Post.*

AN ADDRESS ON ACQUIRED IMMUNITY.

By G. Archdall Reid, M.B. Edin.

Gentlemen,—Against some zymotic diseases—*e.g.*, small-pox and measles—an average individual is able, through illness and recovery, to acquire life-long immunity; against other diseases—*e.g.*, diphtheria and relapsing fever—immunity may be acquired, but is of limited duration only, and in a shorter or longer time the individual, relapsing his acquired powers of making resistance, becomes as liable to infection as ever he was; against a third class of diseases—*e.g.*, tuberculosis and leprosy—immunity can never be acquired; in other words, experience of such diseases never confers on the sufferer increased powers of making resistance even for a limited time, whence it follows, as a corollary, that such diseases may persist in the individual for a length of time that is only limited by the duration of his life, no matter how long that may be.

Now it is very noteworthy that it is only against diseases the micro-organisms of which produce more or less powerful toxins—as judged by their systemic effects—that immunity can be acquired. When the toxins are feeble or non-existent—*e.g.*, in tuberculosis and leprosy, when the onset of the disease is unmarked by symptoms of poisoning, when the pathogenic micro-organisms, instead of engaging at long range, enter at the outset into what may be termed an actual physical struggle with the phagocytes, which, undeterred by toxins, at once attack the disease germs, and taking them into their substance attempt to destroy them, then immunity cannot be acquired. Malaria is an apparent exception to this rule, for here the toxins are undoubtedly powerful, yet immunity seemingly can never be acquired; but it seems probable that this disease should rather be regarded as one against which more or less complete immunity is very rapidly acquired and is rapidly lapsed, for thus only can we explain the alternations of extreme illness, during which the parasites are abundant in the blood, with comparative health, during which they are absent or almost absent from it, and when such of them as still survive the assault of the phagocytes probably exist in a comparatively harmless but highly resistant form—*e.g.*, as resting spores. Moreover, the completeness with which immunity may be produced against any disease, though not its duration, seems, generally speaking, in direct proportion to the quickness with which the toxins are produced and to their degree of virulence. The duration of the immunity depends on factors of which we have as yet no knowledge; but it seems more than probable that it is determined by the chemical constitution of the toxins in each disease. It is clear, then, whenever immunity can be acquired against any disease, that it is associated as effect and cause with the fact that in any such disease more or less potent toxins are always present. In a recently published work I endeavoured to show why this must necessarily be so; but recent though the work is, still more recent researches, especially those in snake venom by Professor Calmette and Professor T. R. Fraser, render necessary further developments and emendations of the hypothesis set forth in it—a hypothesis that is founded on Metchnikoff's famous theory of phagocytosis.

Different inquirers have propounded different theories of *rationale* of acquired immunity. It has been supposed (Pasteur) that the pathogenic micro-organisms of each disease against which immunity may be acquired find, every species of them, some special pabulum on which they subsist, but on which no other species subsist, and that when this special pabulum is exhausted they perish from starvation. In diseases against which acquired immunity is usually permanent—*e.g.*, small-pox—this pabulum, it was supposed, is usually not renewed; but when immunity is not permanent—*e.g.*, diphtheria—it is renewed, whereby the individual once more becomes susceptible. Again, it has been supposed (Chauveau) that acquired immunity arises because the waste products of micro-organisms are inimical to their own life, as alcohol is to yeast; and, therefore, when this reaches a certain percentage in the fluids of the host the micro-organisms perish, as yeast perishes when alcohol reaches a certain percentage in a solution of sugar. In diseases against which acquired immunity is permanent it was supposed by this theory that these waste products are permanently bottled up within the host, but that they are eliminated after a time in diseases against which immunity is not permanent. Both these hypotheses are negatived by the fact that the micro-organisms of certain diseases—*e.g.*, anthrax—are able to flourish in the blood serum of animals that have acquired immunity against them. Metchnikoff's theory supposes that certain cells of the body known as phagocytes attack and destroy the micro-organisms when they find entrance, and that when toxins are present these cells acquire powers of resisting or ignoring them; and, further, when immunity is permanent such powers are permanent, but when immunity is only temporary they are after a time lapsed.

It is now beyond dispute that phagocytosis does occur. All that is in dispute is whether it is the sole or even the

principal cause of immunity. More recently Behring has propounded the theory, which received very general assent, that acquired immunity is due to the elaboration by the host of specific antitoxic substances which chemically neutralised or antagonised the specific toxins as an acid is neutralised by a base. Lastly, Fraser and others, modifying Behring's theory, have surmised that the antitoxins are constituents of the toxins, or else by the action of the host are produced from them, and, like Behring, Fraser thinks that they chemically neutralise the toxins. The theories of Pasteur, Chauveau, and others which it is needless to mention, had their day, but are now known to be erroneous. Metchnikoff's theory was in vogue for some years, but lately seems to have passed somewhat into the background; whereas Behring's theory or modification of it, like Fraser's, appears so well to fit many of the ascertained facts, especially those most recently ascertained, that they are now largely accepted. In particular, Behring's theory appears to be in accordance with his own highly important discovery that if the toxins of a pathogenic organism be injected in proper quantities and for a sufficient length of time into the body of one of the higher animals the blood serum of this animal acquires specific antitoxic properties; that is, a given quantity of it tends to neutralise or render harmless given quantities of the toxins of that particular organism, not only when the substances are mixed *in vitro*, or when they are injected separately into the body of another and a susceptible animal, but also during the course of disease, when the specific toxins are produced within the body, and the specific antitoxin alone is injected; while they do not neutralise or render harmless the toxins of any other species of micro-organisms. But apart from the inherent improbability that the animal body is a species of magic bottle, producing at need highly complex chemical substances, the so-called antitoxins, which exactly neutralise or antagonise other highly complex chemical substances, the toxins, the right antitoxin at the right time, as Behring thinks; or that the toxins contain, or are capable of being converted into substances chemically antagonistic to themselves, and to no other toxins, as Fraser thinks, there are certain facts known to us concerning various diseases which prove that neither theory, even if correct, offers a complete explanation of all the facts, while a closer examination furnishes solid grounds for doubting whether either offers a correct explanation of any of them.

For instance, Pasteur killed rabbits suffering from rabies and dried their spinal cords. His treatment for the cure of an infected subject consisted in the injection into him of an emulsion from an old and thoroughly dessicated cord, was continued by injections from fresher and fresher cords, and ended by the injection of an emulsion from a cord that was absolutely fresh and virulent. By these means he enabled many individuals, who already had been infected, and would otherwise have perished, to acquire immunity. It is clear that the immunising agent, the "antitoxin," is here produced in the dead and drying cord, not in the living infected animal from which the cord was taken, since in the latter case such an animal would not perish if left to itself, as it invariably does, and since the immunising substance is procurable from old and dried cords and not from those which are absolutely fresh. Is is therefore not produced by the vital action of the cells, but arises in the absence of all vital action in a dead thing. No doubt chemical changes do occur in a dessiccating cord, but it would be strange if these resulted (1) in substances chemically antagonistic to the particular toxins and to no other, or (2) in the conversion of the toxins into substances chemically antagonistic to themselves, or (3) in the destruction of the toxic portion of the poison while a hypothetical antitoxic portion was left unaltered. Again, by submitting the baccilli of anthrax to an abnormal degree of heat (from 42° to 43° C.), Pasteur found that they gradually lost their virulence, and found, moreover, that if sheep were inoculated first with bacilli of little virulence, next with those of greater virulence, and lastly with bacilli of great virulence, the animals could be rendered immune to bacilli of the greatest virulence, and could thereby be protected against the disease. In this case the baccilli are introduced alone or with an insignificant amount of toxin. The "antitoxins," whatever they may be, are elaborated within the sheep, and it is difficult to understand, if they are substances chemically antagonistic to the toxins, why they should be elaborated only when the animal has undergone such treatment and not otherwise.

Now these facts are in full accord with Metchnikoff's theory, but are not at all in accord with Behring's. We may believe that in the drying cord of the hydrophobic rabbit, in the abnormally heated anthrax culture, in the calf infected with the organisms of small-pox, in the mild diphtheritic cases, the pathogenic organisms are so altered that they produce enfeebled toxins, and that by these enfeebled toxins the cells (probably the phagocytes) of the infected animal are so inured, so educated, that they are able to resist the stronger toxins of the normal microbes and to destroy the pathogenic organisms producing them; but it is at the least a gratuitous assumption to suppose that micro-organisms, which have been attenuated or constitutionally modified by subjection to a changed environment, produce secretions chemically antagonistic to those which they produce in their normal surroundings, or, on the other hand, as the only alternative, that the infected animal produces them the more readily for previous experience of these attenuated toxins. I think, then, we may fairly conclude that (in the cases cited at least, and probably, as we shall see, in all others) the essential feature of acquired immunity (or increased powers of resistence) is an habituation of the cells concerned to the toxin, as a result of which their phagocytes are able to destroy the pathogenic micro-organisms producing it; and, further, in cases where the toxins are very poisonous, that this habituation, this power of ignoring the toxins and destroying the microbes, is more easily achieved (just as other acquired traits are more easily achieved) gradually, by a series of efforts than at once by a single effort, so that in such an extreme case as rabies, when the toxins are so virulent that normally reaction to them is impossible, immunity may be obtained by subjecting the animal first to weaker and then to stronger toxins, till at last it is able to resist even the strongest toxins, and so escape an otherwise inevitable death.

The principle objections to this view have origin in Behring's discoveries, and from them have resulted his theories and such modifications of them as Fraser's. It was found by him that if toxins—*e.g.*, those of diphtheria—be injected into a living animal—*e.g.*, a horse—beginning with small non-lethal doses and proceeding at intervals to stronger and stronger lethal doses, that the animal experimented on not only acquires immunity against the disease and powers of resisting enormous doses of the toxins, but also that its blood serum (1) when injected into an animal susceptible to the disease tends to render it resistant, just as progressive doses of toxin would (2) when injected into an animal already suffering from the disease tend to bring about a cure, and (3) when injected before or at the same time, or shortly after the toxin, or when mixed with the toxin *in vitro* previously to injection, tends apparently to neutralise or antagonise the toxin; so that, especially in the last case, doses of the toxin much larger than those which are ordinarily lethal can be borne with impunity. Moreover, Fraser found that if snake venom be swallowed, as it may be, in enormous quantities without injury, that then also the animal experimented on acquires immunity and its serum antitoxic properties. In all these instances it was found that the acquired powers are specific—that is, ex

perience of the toxins of any disease confers immunity against that disease alone and not against any other, while the resulting serum also confers immunity against, has curative powers against, and antagonises the toxins of that diseases and no other.

Metchnikoff's theory furnishes an explanation of the increased powers of resistance to any toxin which experience of it confers on the serum producer. In this case, as in disease, we may suppose that the cells concerned become habituated to the toxins, hence the high degree of resistance. But the theory as set forth above is totally inadequate to account for the rest of the phenomena just detailed. Presumably the antitoxic serum contains toxins in solution. It follows, then, that this serum, instead of conferring immunity or antagonising the toxins, should add to the effect of them by increasing the dose. The fact, however, is the reverse, for it clearly does confer immunity and apparently also, judging from the experiments *in vitro*, it does antagonise the toxins. Except then, these difficulties are surmounted we must abandon the theory which supposes that increased powers of resistance are due to increased powers of toleration.

They key to the mystery is probably furnished by Fraser's experiments. We have seen that snake poison may be swallowed in enormous quantities, when, so far from causing death, it actually confers some degree of immunity on the animal swallowing it and some degree of immunising power on his serum. Fraser, indeed, conjectured "that the venom while in the stomach had been subjected to a process of analysis by which the constituents which are poisonous had failed to be absorbed into the blood or had been destroyed in the stomach, while the constituent or constituents which are antivenomous, or rather antidotal, had passed into the blood in sufficient quantity to protect the animals against otherwise lethal administrations of the venom." But this conjecture seems very improbable and far-fetched. On biological grounds it is highly improbable, to say the least, that snake venom contains a substance antidotal to itself—*i.e.*, that the animal's weapon of offence and defence has combined with it a substance which enfeebles it. Again, it is not in accordance with known facts that the alimentary canal possesses the power of intelligent choice which Professor Fraser attributes to it, by virtue of which it accepts the good and rejects the evil. The function of the canal is digestion; and surely, since animals are not poisoned by huge doses of swallowed venom, we are entitled to assume that the venom, like other proteids, undergoes digestion; and, further, since the swallowing of venom confers on the animal increased powers of resisting the injected poison, and on its serum antitoxic properties, that these effects are due to a reaction, induced by the altered, the attenuated, the digested toxin, of a similar nature to that induced by other altered and attenuated toxins—*e.g.*, those of rabies, anthrax, or small-pox. If this be admitted, as I think it must, then we arrive at the conclusion, of great importance in our inquiry, that here the venom is attenuated by ferments secreted by cells lining the alimentary tract, not by the cells themselves—that is, by ferments which digest the toxins extra-cellularly, but are innocuous to the cells themselves.

Now, phagocytosis itself, whether in low unicellular or high multicellular organisms, is nothing other than a process of digestion—*i.e.*, the cells destroy the micro-organisms which they have taken up, not by mechanical means, by pressure, or by tearing, but, as cannot be doubted, by digestive substance which they secrete, and it has been further proved that they are capable of performing the digestive act, not only intracellularly, but like the stomach cells or the cells of the pancreas and the salivary glands extracellularly also. For instance, Metchnikoff found that when the gregarines which infest the male genital organs of the earthworm become passive previously to spore formation they are attacked by wandering cells which form a thick plasmodium round them. The parasite on its part forms a thick cyst-wall, but nevertheless frequently undergoes degeneration and death. Kanthack and Hardy found that when anthrax bacilli are introduced into frog's blood "the coarsely granular oxyphile cells act as unicellular glands, discharging or secreting their granules, and these granules dissolving appear to exert a deleterious action on the bacilli, in consequence of which the hyaline cells are now capable of ingesting them." Other inquirers have made observations of a like tendency. And it has also been found that intruding micro-organisms perish when at a distance from the cells as well as when they are ingested, or when the cells are applied closely to them. Thus Nuttal, on introducing a fine cannula containing attenuated anthrax bacilli into a rabbit's ear, found that phagocytosis reached its maximum, after twenty-two hours, but that even then half the bacilli lay free and not ingested by the phagocytes, but exhibited nevertheless as much signs of degeneration as those which had been ingested. Thus also it has been found that during recovery from diphtheria and pneumonia numbers of the pathogenic microbes perish without direct conflict with the cells. It is not too much to assume that the same agent causes the death of free microbes as that which causes the death of those which are actually ingested or those to which the phagocytes are directly applied. In other words, we have good reasons to believe that they perish by reason of a digestive substance secreted by the cells and set free into the fluids of the body, just as pepsin is set free in the fluids of the stomach. Direct evidence of the presence of this digestive substance was furnished by Leber, who placed pieces of copper in the anterior chamber of the eye, producing a purulent collection devoid of micro-organisms, the exudate from which was capable of digesting proteid matter. This, then, since it is highly improbable that there is one substance which destroys the baccilli at close quarters and another which destroys them at long range, is probably the germicidal substance found in the plasma and the serum of immune animals. But of course the digestive substance must be in greater concentration within the cells producing it and in their immediate neighbourhood than at a distance, and therefore it must act more effectively in the former than in the latter case. On the other hand, the toxins produced by the microbes must also be in greater concentration, and must act more effectively on objects in their immediate neighbourhood, and especially on those with which they are in actual contact, for which reason, doubtless, it is that micro-organisms which do not produce toxins, or produce only feeble toxins—*e.g.*, those of leprosy and tuberculosis—are at once attacked and taken up by the phagocytes, while micro-organisms which produce strong toxins—*e.g.*, those of anthrax and diphtheria—are not taken up till a later period, when the phagocytes have become habituated and resistant to the toxins, or even are not taken up at all, but are engaged only at long range. It is probable that the digestive substance produced by the cells is normally present in them, but that its secretion is greatly accelerated by the presence of certain foreign bodies in the blood—*e.g.*, bacteria and their toxins.

But besides the germicidal substance there is irrefragible evidence proving that in the blood of an infected but resistant animal, or in that of a resistant animal into which toxins have been injected, there is present another and probably a distinct substance which destroys or renders inert the toxins; and, reasoning from analogy, this also in all probability is a digestive substance. The commonly accepted theory is that it is a substance which chemically antagonises the toxins; but such a view com-

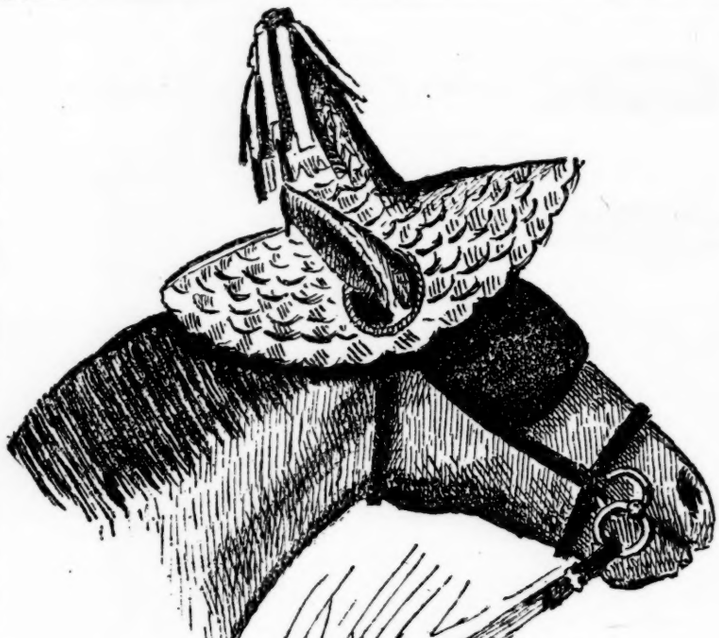
mits us, as we have seen, to the belief that all the separate toxins of the separate diseases are separately antagonised by different antitoxins—a belief hardly reasonable when we consider the multitude of the diseases and the complex chemical nature of their toxins. On the other hand, it is by no means incredible that a single digestive body is capable of digesting all these "toxalbumins" just as pepsine is capable of digesting a variety of proteid substances, or even that there are two or three different digestive bodies which severally digest the toxic albumoses, globulins, peptones, etc., which the different species of pathogenic micro-organisms produce. Moreover, this antitoxic substance is very rapidly produced, since it has been found in blood drawn from a rabbit's ear immediately after the introduction of the toxin, this seems still further to confirm the view that it is a digestive body; for while appropriate stimulation (that from a toxin) might well cause its rapid secretion by cells that manifestly do perform digestive functions and otherwise closely resemble their remote amœboid ancestors, it is unlikely, not to say impossible, that these cells can instantly elaborate the right chemically antagonistic substance when they are assailed by this or that toxin, especially when the toxin is produced by a microbe of which their ancestry can have had no experience, and against which, therefore, no specific powers can have been evolved. I think we may fairly conclude, then, that the destruction or attenuation of toxins which occur in the body of a resistant animal is due to their digestion by an enzyme secreted by cells that have that special function, and it follows, if this view be true, that when a resistant animal is recovering from a disease in which toxins are abundant, or when repeated doses of toxins are injected into a resistant animal, there must be present in his blood and in his serum when drawn off, firstly, two or more digestive substances, and, secondly, *toxins in all stages of digestion.*

Apparently acquired immunity consists essentially of an acquired power of tolerance, by virtue of which the cells concerned are able to perform their functions in spite of the presence of toxins. In the case of the cells specially concerned in zymotic diseases—*i.e.*, those concerned in the destruction and removal of the pathogenic micro-organisms and their toxins—this acquired power enables them the more readily to produce the two or more digestive bodies inimical to the ferments and their toxins. But if an animal which has not acquired immunity (in the case of diseases against which permanent immunity may be acquired), or which has lapsed its acquired immunity (in the case of diseases against which permanent immunity cannot be acquired), be infected, then the cells concerned being poisoned may not react at all—*i.e.*, may fail to produce their digestive bodies, when the proliferation of the invading microbes and the elaboration of their toxins will continue unchecked, and the animal will perish; on the other hand, in an animal which has not acquired immunity, or which has lapsed its immunity, the inborn powers of resistance of the cells may be, and is, as regards most animals in relation to most diseases, so great that they are able to produce the digestive bodies to some extent from the first in spite of the presence of the toxins, and therefore most animals are capable of recovering from most of the diseases to which they are liable. Digestion—*i.e.*, attenuation—of the toxins then occurs, till in time there are present in the animal's blood toxins in all stages of digestion, from virulent toxins newly produced, and hardly affected by the enzymes, to toxins long produced, and so enfeebled as scarcely to deserve the name; and, as reasoning by analogy we may suppose, *up that graduated scale it is probable the cells of the animal react till complete immunity is attained*, just as the cells of an animal affected by rabies and anthrax react when treated to the less finely graduated toxins provided by Pasteur's treatment.

Moreover, if the blood serum of such an animal be removed and injected into a susceptible subject, either one not yet infected, or, if infected, one the cells of which are not poisoned beyond the power of reaction, this second animal also will thereby be provided with a means of achieving immunity. If he be not infected the altered toxins will provide him with a scale of graduated poisons up which his cells may react towards complete immunity, the completeness of the immunity acquired by him being proportionate to the virulence of the toxins at the more poisonous or least digested end of the scale. If he be already infected, not only will the injection provide him with a scale of graduated toxins, but it will also provide him with digestive bodies wherewith to attenuate the toxins which are then being elaborated by the micro-organisms infecting him. But of course the blood serum of an animal which has been infected and is recovering from the disease will be infinitely inferior in curative and immunising power to the serum of an animal into which the large quantities of toxin (elaborated in an artificial medium) have been injected in oft-repeated doses extending over a length of time, since in the latter case the quantity of attenuated toxins and digestive bodies will naturally be much greater than in the former. It further follows that, if we mix toxins with fresh antitoxic serum *in vitro* at a suitable temperature and for a sufficient length of time, the digestive bodies present in the latter will attenuate the former, and, therefore, that much larger doses of toxins can be administered without death in this way to a susceptible animal than in any other. Professor Fraser contends that, since antitoxic serum when mixed with toxins *in vitro* "neutralises" the latter more effectually after twenty minutes' contact than after contact of five minutes, proof is thereby supplied or a probability raised that such a neutralisation is a chemical one in the sense meant when we say that an acid is neutralised by a base; but surely when we remember the comparative rapidity of chemical and the comparative slowness of physiological reaction the probability is that we have here to deal with a digestive process rather than a mere chemical combination, a probability immensely strengthened by the consideration already dwelt upon that it is hardly likely that the animal body is a magic bottle producing at need the right toxins on the right occasion.

Various other considerations lend strength to the belief that acquired immunity against any disease depends essentially on a gradual habituation to its toxins, or an increased power of physiological resistance, as a result of which cells are enabled to perform their functions in spite of the presence of the toxins (which indeed do then but stimulate the cells specially concerned—*i.e.*, those which produce the digestive bodies), not on the production of chemically antagonistic substances; and further that the persistence of immunity depends on the persistence of this power, not on the continued persistence within the system of antidotal substances, whether chemical (in the narrow sense) or digestive. For instance, it was found by Rox and Vailliard that, if too large or too frequent doses of tetanus toxin are injected into the horse, the antitoxic powers of the serum disappear for a time, and the serum actually becomes toxic; yet the horse manifests no symptoms of tetanus, as it would did immunity depend on the production of chemically antagonistic substances and not on a habituation to the poison. In this case it is evident that the cells of the horse are unable to produce digestive bodies fast enough to quickly attenuate the excessive quantity of toxin. Again it was found by Buchner that a mixture of toxin and antitoxin—*e.g.*, that of tetanus—in a proportion harmless to an animal of one susceptible species—*e.g.*, a mouse—is still toxic to a weaker animal of the same species or to an animal of a more susceptible species—*e.g.*, a guinea-pig—which could not be the case did the antitoxin contain substances which neutralised the toxin; whereas, if immunity depends immediately

A HORSE'S SUN HAT.



Horses as well as human beings suffer severely from excessive heat such as we have experienced during the present summer. In two cases within our own knowledge, a season or two ago, horses literally dropped dead in the harness before completing a long drive with excursion parties under a broiling sun; and cases of illness stopping short of immediate fatality are of frequent occurrence. It is for the purpose of affording a measure of protection to this important friend of man that the horse's hat has been devised. It is a French invention, first used several years ago in Bordeaux; and the British consul there reports that while the tramway company used formerly to lose a dozen horses during the hot weather, they have not had a single sun fatality since they adopted the summer head gear. Mr. Percy, a member of the firm of Percy & Co., wine merchants, 26 Great Tower Street, London, was the means of introducing them into this country. This is the third season during which they have been worn by the van horses of that firm; and on humanitarian grounds Mr. Percy has endeavoured zealously, and with a considerable measure of success, to popularise the hat by presenting specimens to carters, vanmen, and others. Formerly he obtained his supplies from the continent, but this year a large number have been manufactured in Luton, the great seat of the English straw-plaiting industry, and these are said to be lighter and better than the hats obtained from abroad. Samples have been sent to the Prince of Wales, the Duke of York, and other royal personages; and it is an indication of the extent to which the innovation is spreading that orders have already been executed in Luton for the Duke of Portland, the Duke of Albany, the Duke of Sutherland, the Duke of Westminster, Lord Roberts, Lord Lonsdale, Lord Herschell, Lord Nelson, the Earl of Pembroke, the Bishop of Gloucester.

The hat is made of straw and is very light, although broad enough to form a wonderfully ample sunshade. Further relief from the heat may be afforded by inserting a vinegar sponge in the high conical crown. There are two holes through which the horse's ears pass, and the hat is tied under the chin with ribbons, the sides being pulled down in a manner which gives it a Dolly Varden shape. A top bunch of blue and red ribbons adds another picturesque effect to a piece of headgear which is not only serviceable for the dray horse but smart enough for the pony of a lady's phaeton. No difficulty has been experienced in accustoming horses to the use of the hats, which can be had at a shilling a-piece. Their use, we may add, is being strongly urged by the Society for Prevention of Cruelty to Animals.

We are indebted to Mr. J. G. M'Lellan Arnott, Dumfries, for the drawing.—*Dumfries and Galloway Saturday Standard.*

on a physiological, not on a chemical, reaction, even an attenuated toxin may be fatal to a very susceptible animal; an inference corroborated by the fact that a non-susceptible animal may be rendered susceptible by influences—*e.g.*, cold or starvation—which lower the vitality. —*The Lancet.*

CORRESPONDENCE.

LOOSE CARTILAGE IN STIFLE JOINT.

Sir,

I am much surprised at the position taken up by Mr. Miller in yours of the 11th, I asked a number of plain straightforward questions, and instead of answering them he accuses me of doubting his veracity and makes some eloquent remarks about the "majority of veterinary intelligence" whatever that may mean.

Will Mr. Miller, I again ask, tell us where the incision was made and the structures he cut through and what he means by talking about the upper third of the tibia. If he still intends withholding all the particulars of this operation he might as well not have troubled writing us. Notwithstanding Mr. Miller's remarks I am of opinion the average veterinary surgeon was as much surprised at some of the statements in his article as I was.

Regarding his veracity, I did not exactly doubt it, as he thinks, but was inclined to think there was an error in description somewhere, but to prevent any mistake I will put the matter plainly and say, if Mr. Miller cut into the stifle joint making an incision large enough to remove the structures mentioned, had an open joint and all the consequent complications, and had the animal sound in a fortnight, although it had been lame for months previously, then I say I look upon the performance as a triumph of modern surgery; so great a triumph in fact and so different from what we have been accustomed to that I again ask him to tell us all about it and also tell us where the animal can be seen.

ENQUIRER.

COMMUNICATIONS, BOOKS, AND PAPERS RECEIVED:—Messrs. P. J. Howard, H. P. Armsby, T. B. Bindloss, G. Mayall, A. Ridlington, "Enquirer." *The Agricultural Journal* (Cape)